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Parameters selection for information storage reliability assessment and prediction by absolute values

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Abstract

© 2018, Institute of Advanced Scientific Research, Inc.. All rights reserved. The problem of choosing parameters for estimating and predicting the reliability of an information storage device is considered. It is that manufacturers of hard disk drives do not always unambiguously fill SMART parameters with corresponding values for different models. In addition, some of the parameters are sometimes empty, while the other parameters have only zero values.The scientific task of the research consists in the need to define such a set of parameters that will allow estimating and predicting the reliability of each individual storage device of any model of any manufacturer for its timely replacement. For this purpose, a separate grouping of normally operating, early-decommissioned and failed drives was performed.The scale of the values for each parameter was divided into ranges. A number of storage devices that fall within a certain range of values, was counted. The distribution of storage devices was studied in absolute values for each parameter under consideration. The following conditions were used to select suitable parameters for estimating and predicting the reliability of the parameters based on their values: 1) The number of normally operating drives that have a reliability parameter value within the range of large values should always be less than those that failed; 2) The monotonicity of the increase in the number of drives in the series should be observed for large values of reliability parameters: normally operating, early removed, and failed; 3) The first two conditions must be fulfilled both in general and in particular, for example, for the drives of each manufacturer separately. Nine parameters were selected as a result of studying absolute values for the suitability to use in evaluating and predicting the reliability of data storage devices: 1 Raw read error rate, 5 Reallocated sectors count, 7 Seek error rate, 10 Spin-up retry count, 184 End-t--end error, 187 Reported uncorrectable errors, 196 Reallocation event count, 197 Current pending sector count, 198 Uncorrectable sector count.

Keywords

Information, Parameter, Predicting, Reliability, Storage device

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